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Happy Maths

Time and Money

Written by Mala Kumar
Illustrated by Angie & Upesh

Happy Maths - 4 Time and Money by Mala Kumar

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Illustrations: Angie & Upesh

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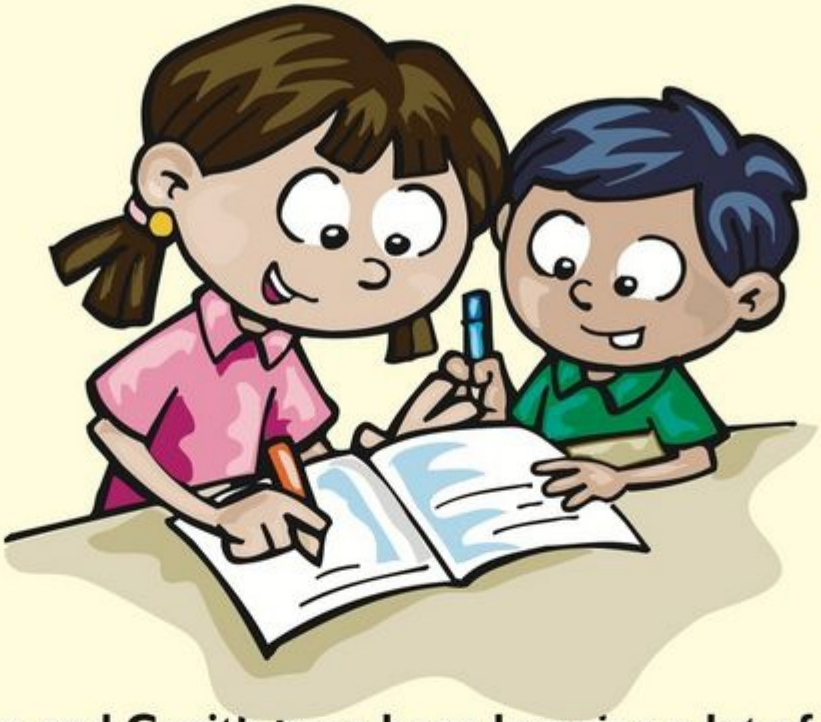


Sankhya and Ganith have been learning a lot of things in their mathematics class.
Join Sankhya and Ganith in their happy discoveries about mathematics.

Zzero and Eka are friends of Sankhya and Ganith.

Grown-ups always keep saying that time is precious. They say that money is precious too.

In this book, Sankhya and Ganith spend some time learning about money.

Bhaskaracharya and Leelavathi

Sankhya and Ganith were sitting on a cot outside their grandfather's house. Grandpa had just come back from the little watch shop where he worked.

He always came back home almost at the same time each evening.

"Ajja, which is the biggest clock in your shop?" asked Ganith.

"We have a 6-ft tall Grandfather Clock, and the smallest in the shop is a watch which is just 1 cm wide," replied Grandpa.

"In olden days, people had strange devices to measure time. Hourglasses that used sand and water clocks were very popular."

"Water clock? What is that, Ajja?" asked Sankhya in a fraction of a second.

"Let me tell you the story of Leelavathi…." said Ajja.

Some of the world's greatest mathematicians were Aryabhatta, Varahamihira and Bhaskaracharya.

Bhaskaracharya lived in India 800 years ago. He was a well -known astrologer too. He wrote a book called 'Leelavathi' in which he stated problems in the form of poems and stories.

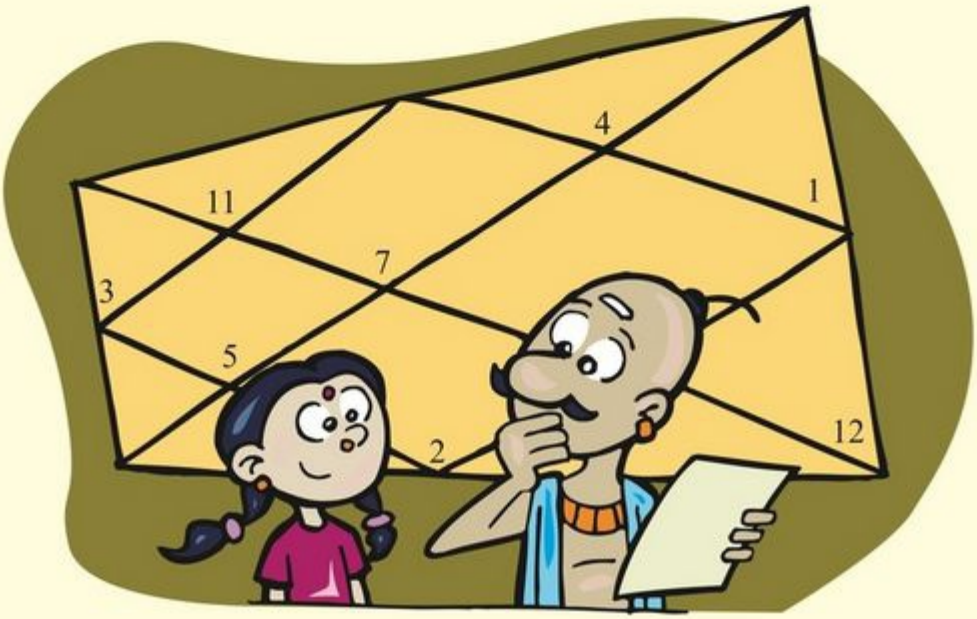
Why did he call his work 'Leelavathi'?

Leelavathi was the name of Bhaskaracharya's daughter. When the child was born, her horoscope was prepared and examined. Bhaskaracharya made some calculations using astrology and found that she was destined to become a young widow. But he thought he could change the destiny of his daughter by using his wisdom.

When Leelavathi was just a little girl, Bhaskaracharya decided to celebrate her marriage. The mathematician calculated the best minute in the day when the marriage could take place.

The family took great care to make sure that the marriage would take place exactly at that minute.

In those days there were no clocks to measure time. Two water pots kept one on top of the other were used to measure time.



The water kept in the upper pot would trickle down through a narrow hole into the lower pot. This lower pot was graduated according to the unit of time then in use.

This unit was the '*Nadika*'. One *nadika* was roughly equal to 24 minutes. So the time of the day was measured by observing the depth of water in the lower container.

On the day of the marriage, Leelavathi was playing with her friends. She was fascinated by the water clock. She bent over it and was looking into the water.

A pearl from her nose stud fell into the pot. It lodged itself in the hole of the upper pot.

The flow of water into the lower pot was reduced. No one was aware of this and she was married exactly at the time when the water reached the specified level. Nobody knew that the auspicious time had already passed and the time indicated by the water clock was not the correct time. Even Leelavathi was not aware that one of her pearls had fallen into the pot. By the time her father and others knew about the pearl, the marriage had taken place.

Her husband died within a few days. Why, we do not know. And everyone believed it was because she got married at the 'wrong' time! People believed in a lot of superstitions in those days. Some people believe in such superstitions even today.

When Bhaskaracharya wrote his magnificent mathematical essay, he named it after his daughter. He taught mathematics to Leelavathi and made her highly proficient in the subject.

The essay 'Leelavathi' deals with arithmetic and algebra.

He wrote the problems in the form of verse and stories.

Bhaskaracharya also wrote another mathematical essay called the 'Siddhanta Shiromani' which deals with the position and

movement of heavenly bodies and methods to determine them.

When Akbar ruled India, his court poet Faizi translated 'Leelavathi' into Persian. Later, during Shahajahan's rule, Bhaskaracharya's other works were also translated.

Sankhya and Ganith had several questions of course. Grandpa answered all their questions. He had some questions for them too.

Do see if you can help them:

1. The day has been divided into 24 hours. If a person works for 7 hours every day of a week, and if he can repair two watches in one hour, how many watches does he repair in a week?
2. Let us say it takes 2 hours for the water in the upper pot of a 'water clock' to be transferred fully to the lower pot, how many seconds is that?
3. Bhaskaracharya lived 800 years ago. How many months ago is that? How many hours ago is that?

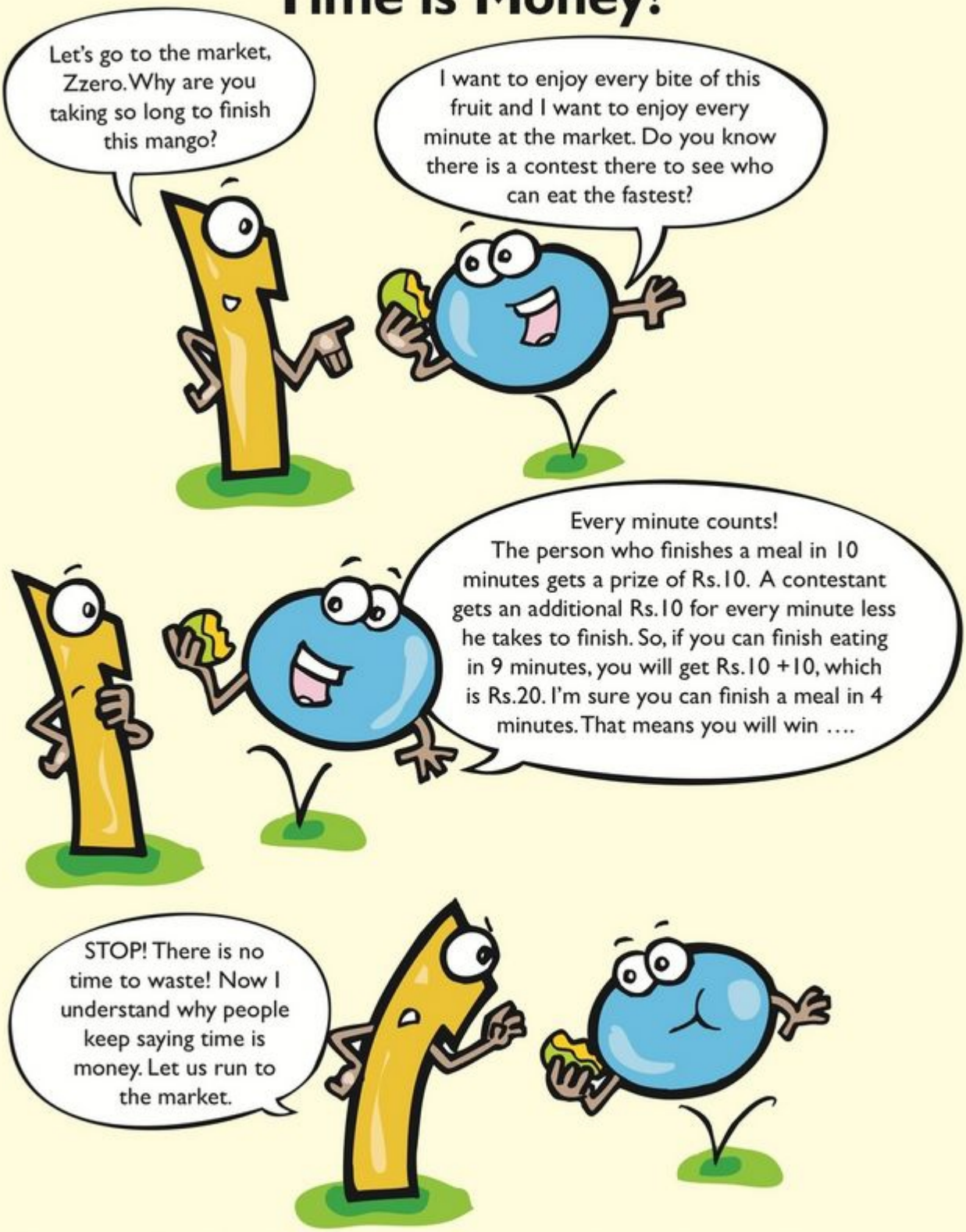
Sundial

Maharaja 'Sawai' Jai Singh II (1686-1743) was the ruler of the Rajput State of Amber in India. He was an excellent mathematician, astronomer and town planner. He set up the famous observatories known as Jantar Mantars and built the city of Jaipur.

Maharaja 'Sawai' Jai Singh built five observatories. An observatory is a place from where one can observe the stars and planets. It is also a place that has instruments that help observers to calculate planetary positions, weather conditions and the time.

The observatory in Jaipur has one of the world's biggest sundials. It can tell the correct time almost to the second.

Time is Money!



Zzero walked back home that evening after winning 80 rupees!
How many minutes did he take to finish the meal at the contest?

Matter of Money

Sankhya and Ganith do not get pocket money. But on birthdays and festivals, someone usually gives them some money. Sankhya saves her money in the Aryanagar Community Bank. She has a passbook. It tells her how much money she puts in, the date when she puts in the money, how much money she takes out (or 'withdraws') and the dates when she withdraws.

The bank also pays her an 'interest' each year to show that it is happy that she saves her money in the bank. If she saves Rs.100 in the bank in one year, the bank pays her Rs.10 as interest.

Ganith spends half his money almost as soon as he gets it.

He saves the other half in a 'fruit-bank', a melon-shaped, closed clay - pot with a slit on top through which coins and folded rupee notes can be dropped in.

"How much money do you have in the bank, Sankhya?" asked Ganith one day.

"Lots and lots!" said Sankhya.

"But what are you going to do with the money?"

"Someday, when I need it very much, I will use it," said Sankhya.

Ganith was not happy with this reply. What was the use of money that could not be used immediately?

"Sankhya, how I wish I could buy a bicycle NOW! We could surprise Amma and Appa by getting a cycle before they return

from work today!" Sankhya and Ganith looked at the Classified columns in the newspaper. 'For sale: second-hand cycle in good condition. Rs. 600. Contact: Suresh, Head Clerk, Chandrapur Post Office.'

"Let's count the money in my 'melon'. If we bargain, Suresh may give the cycle for less than Rs.600. If I don't have 600 rupees, will you help me by paying the difference ?" Ganith asked.

The brother and sister looked at each other. Sankhya spread out a towel on the floor.

Ganith brought his 'melon' and gently dropped it on the towel. Coins and notes fell off. This is what they found.

Denominations	Numbers	Note/Coin	In Rupees
Rs. 100.00	1	Note	Rs. 100.00
Rs. 50.00	3	Note	Rs. 150.00
Rs. 20.00	6	Note	Rs. 120.00
Rs. 10.00	4	Note	Rs. 40.00
Rs. 5.00	5	Note	Rs. 25.00
Rs. 2.00	3	Coins	Rs. 6.00
Rs. 1.00	8	Coins	Rs. 8.00
Rs. 0.50	7	Coins	Rs. 3.50
Total			

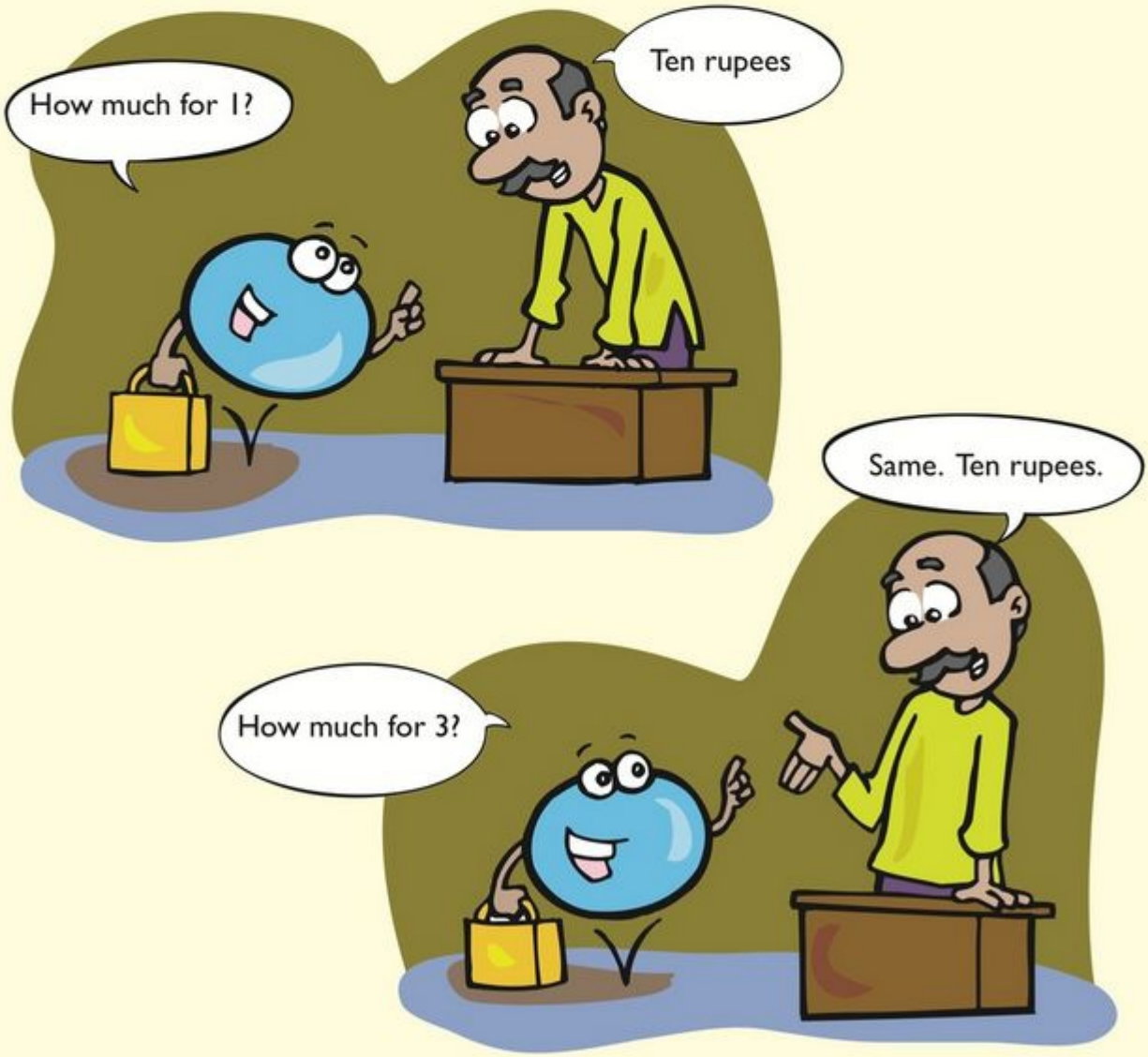
1. How much money had Ganith saved in his 'melon-bank'?
2. Ganith and Sankhya have to buy tickets worth Rs.8 each to go to Chandrapur by bus. Who do you think should pay for this?
3. Both Sankhya and Ganith can ride doubles. They are confident cyclists. Assuming that Suresh does not reduce the price of the bicycle, how much money do they have to carry with them when they leave their house to buy the cycle?
4. How many paise make a rupee?
5. How much money did Ganith have to borrow from Sankhya to buy the bicycle?

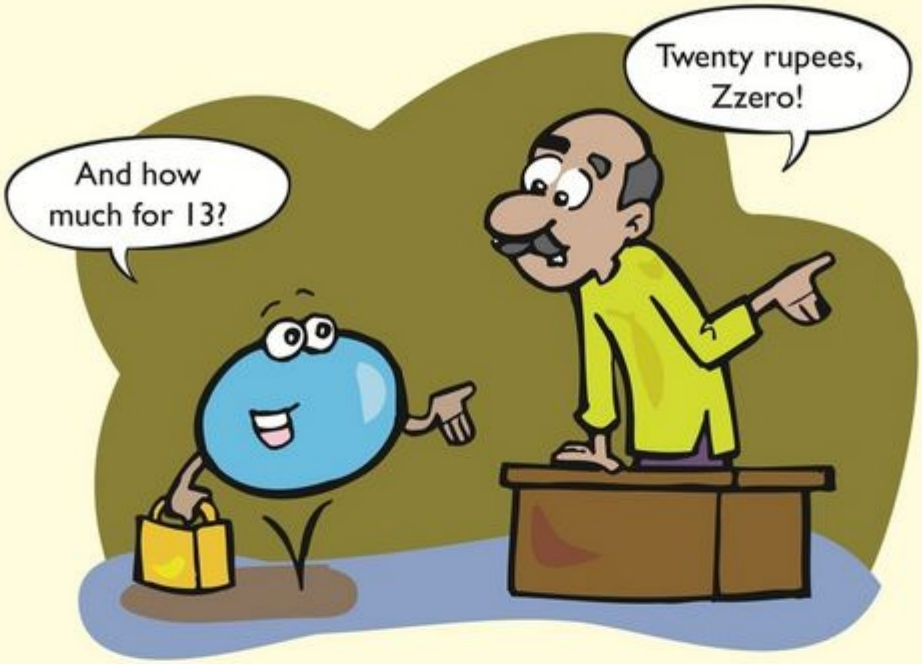
Zzero goes shopping

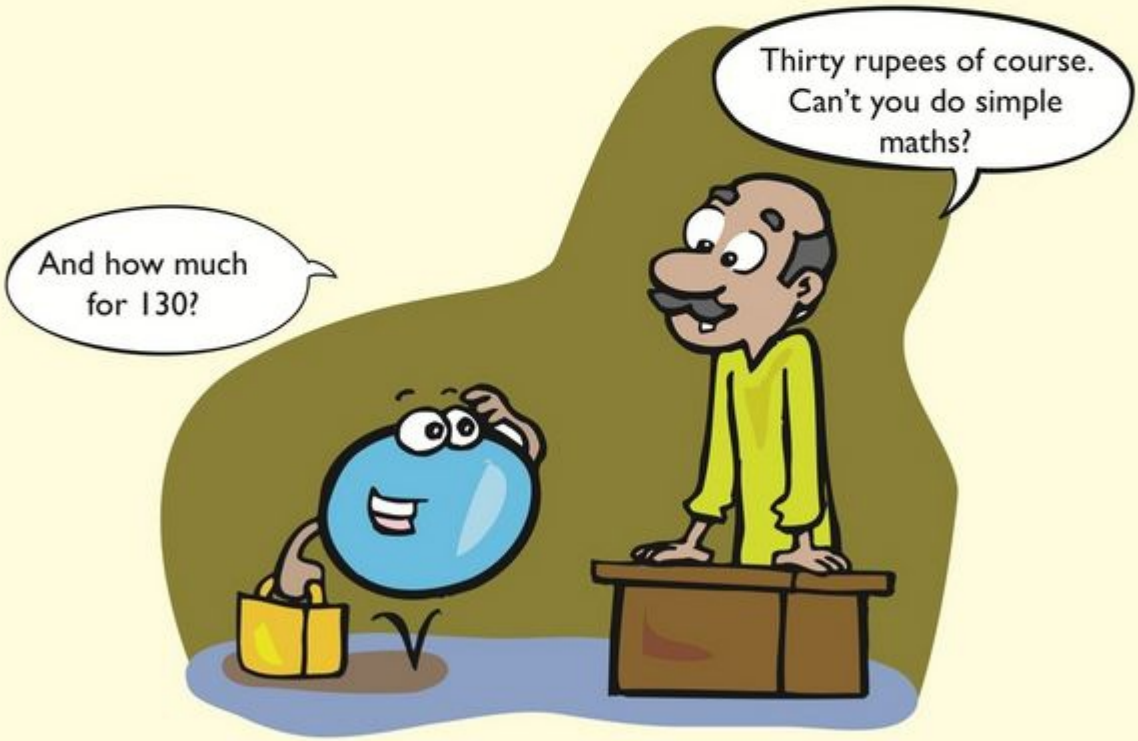
Zzero went to a very special shop one day. The 'items' displayed there were in different colours and shapes.

Razaak, the glass cutter, sat in the little shop and cut out the 'items' with great care and style.

Many shop-owners, car and two-wheeler owners, and home-owners came to his shop to buy his products.

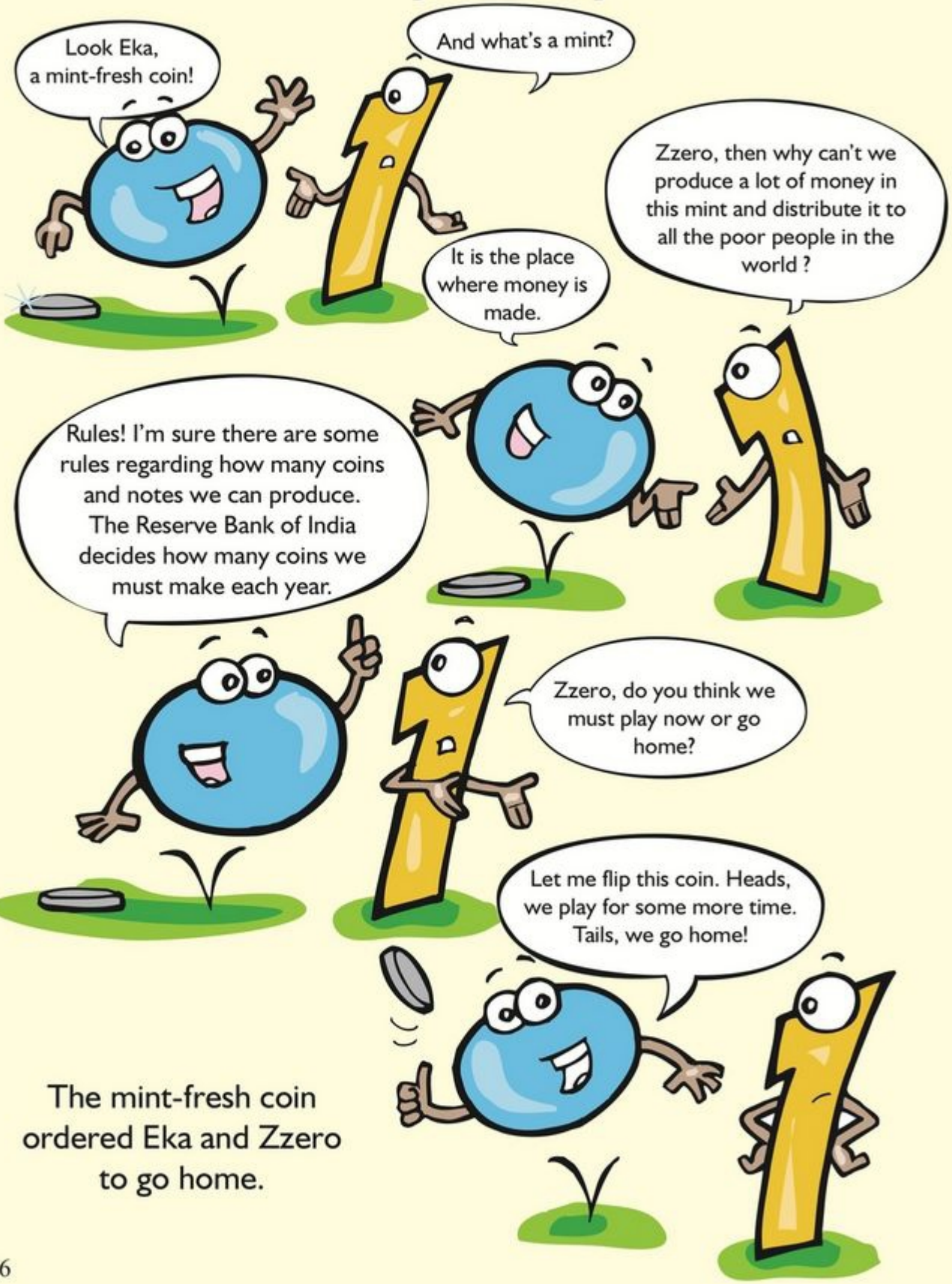






Can you tell me what Razaak was selling?

Funny Money



The mint-fresh coin ordered Eka and Zzero to go home.

Indian Money

India brought out its distinctive coins on 15th August, 1950.

Coins are minted at the five Indian Government Mints at Mumbai, Alipore (Kolkata), Saifabad (Hyderabad), Cherlapally (Hyderabad) and NOIDA (Uttar Pradesh).

Observe the coins that we use now.

The 5 rupee coin is made of nickel and copper.

The 2 rupee coin is also made of nickel and copper.

The 1 rupee coin, 50 paise coin, 25 paise coin and 10 paise coin are all made of stainless steel.

Sankhya's parents and teachers keep saying that Time and Money are both very important in life.

Sankhya plans to spend her money to buy books and spend her time reading them.

What do you plan to do with your time?

Answers

Answers to 'Bhaskaracharya and Leelavathi' Page 7

1. 98 watches. He repairs 2 watches in 1 hour. In 7 hours he would repair 7 x 2=14 watches. In 7 days he would repair 7 x 14=98 watches.

2. 7200 seconds.
   1 hour = 60 minutes.
   2 hours = 2 x 60=120 minutes.
   1 minute = 60 seconds.
   120 minutes = 120 x 60 = 7200 seconds.

3. 9600 months, 6912000 hours.
   1 year =12 months.
   800 years =12 x 800= 9600 months.
   1 month = 30 days (approximately).
   9600 months = 9600 x 30 = 288000 days.
   1 day = 24 hours. 288000 days = 24 x 288000 = 6912000 hours.

Answer to 'Time is Money' Page 9

1. 3 minutes. Zzero must have gobbled the food unchewed!

Answers to 'Matter of Money' Page 13

1. Rs.452 and 50 paise. It is written as Rs.452.50

2. Eka thinks Ganith should pay for the bus tickets because they are going to buy a cycle for him. Zzero thinks Sankhya should buy the tickets because she is the elder sister. Some people think we should each buy our own tickets when we travel together.

3. Rs.616 at least. Carrying Rs.632 will be better. Rs.600 for the bicycle, Rs.16 for the bus tickets one way as they can ride back on the new bicycle. If they cannot ride the cycle for some reason (Can you think of reasons why they may not ride the cycle?) then they would need another Rs.16 for the two bus tickets on the return journey.

4. 100 paise make a rupee.

5. Rs.147.50 for the bicycle. If he had to pay for the bus tickets, he would have to borrow more. Rs.147.50 + Rs.16=163.50

Answer to 'Zzero goes Shopping' Page 14

1. Razaak was selling digits - that made up house numbers and vehicle numbers. Each digit costs Rs.10. Zzero lives in House Number 130 - that's three digits. If each digit costs Rs.10, then 130 would cost 3 X 10=Rs.30

Aadab, I am Kaafiya Bano. I love playing kho-kho and would love to meet my favorite actor Shahid Kapoor. I really enjoy reading books with animal stories.
Thank you for buying this book. My friends and I will get to read many more books in our library because you bought this book.

Mala Kumar is a journalist, writer and editor based in Bangalore. Her stories for children have won awards from Children's Book Trust. She discovered her love for teaching while conducting non-formal workshops in mathematics in schools, using the day's newspaper instead of text-books.

Angie is a graphic designer and in her spare time loves to keep busy with ceramic. Upesh is an animator who collects graphic novels and catches up with alternate cinema in his spare time. Together they form 'The Other Design Studio'.

This is a mathematics book with a difference.
There are more stories here than problems!
So read the stories, absorb the mix of facts and fiction and enjoy teasing your brain.

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